

FINAL REPORT
APRIL 1998

REPORT NO. 98-07

M118 DEMOLITION CHARGE IN WIREBOUND WOODEN BOX UNITED NATIONS (UN) PERFORMANCE ORIENTED PACKAGING (POP) TESTS

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

Prepared for:
U.S. Army Armament Research, Development
and Engineering Center
ATTN: AMSTA-AR-ESK
Rock Island, IL 61299-7300

VALIDATION ENGINEERING DIVISION
SAVANNA, ILLINOIS 61074-9639



20010227 060

AVAILABILITY NOTICE

A copy of this report will be furnished each attendee on automatic distribution. Additional copies or authority for reprinting may be obtained by written request from Director, U.S. Army Defense Ammunition Center, ATTN: SIOAC-DEV, 3700 Army Depot Road, Savanna, IL 61074-9639.

DISTRIBUTION INSTRUCTIONS

Destroy this report when no longer needed. Do not return.

Citation of trade names in this report does not constitute an official endorsement.

The information contained herein will not be used for advertising purposes.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

| REPORT DOCUMENTATION PAGE | | | | Form Approved OMB No. 0704-0188 | |
|--|-------|---|---|--|--|
| 1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED | | | 1b. RESTRICTIVE MARKINGS | | |
| 2a. SECURITY CLASSIFICATION AUTHORITY | | | 3. DISTRIBUTION / AVAILABILITY OF REPORT UNLIMITED | | |
| 2b. DECLASSIFICATION / DOWNGRADING SCHEDULE | | | | | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S) 98-07 | | | 5. MONITORING ORGANIZATION REPORT NUMBER(S) | | |
| 6a. NAME OF PERFORMING ORGANIZATION U.S. Army Defense Ammunition Center | | 6b. OFFICE SYMBOL (if applicable) SIOAC-DEV | 7a. NAME OF MONITORING ORGANIZATION | | |
| 6c. ADDRESS (City, State, and ZIP Code) ATTN: SIOAC-DEV Savanna, IL 61074-9639 | | | 7b. ADDRESS (City, State, and ZIP Code) | | |
| 8a. NAME OF FUNDING / SPONSORING ORGANIZATION U.S. Army Armament Research, Development and Engineering Center | | 8b. OFFICE SYMBOL (if applicable) AMSTA-AR-ESK | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER | | |
| 8c. ADDRESS (City, State, and ZIP Code) ATTN: AMSTA-AR-ESK Rock Island, IL 61299-7300 | | | 10. SOURCE OF FUNDING NUMBERS | | WORK UNIT ACCESSION NO. |
| | | | PROGRAM ELEMENT NO. | | |
| 11. TITLE (Include Security Classification) M118 Demolition Charge in Wirebound Wooden Box United Nations (UN) Performance Oriented Packaging (POP) Tests | | | | | |
| 12. PERSONAL AUTHOR(S) Bradley J. Haas | | | | | |
| 13a. TYPE OF REPORT Final | | 13b. TIME COVERED FROM _____ TO _____ | | 14. DATE OF REPORT (Year, Month, Day) 1998 April | |
| 15. PAGE COUNT | | | | | |
| 16. SUPPLEMENTARY NOTATION | | | | | |
| 17. COSATI CODES | | | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) | | |
| FIELD | GROUP | SUB-GROUP | | | |
| | | | | | |
| | | | | | |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number) The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV) was tasked by U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct United Nations (UN) Performance Oriented Packaging (POP) tests on the package of M118 demolition charges in a wirebound wooden box, for compliance with UN POP requirements. The M118 demolition charges in a wirebound wooden box met all UN POP test requirements. | | | | | |
| 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS | | | 21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED | | |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL JEROME H. KROHN | | | 22b. TELEPHONE (Include Area Code) 815-273-8929 | | 22c. OFFICE SYMBOL SIOAC-DEV |

U.S. ARMY DEFENSE AMMUNITION CENTER
VALIDATION ENGINEERING DIVISION
SAVANNA, IL 61074-9639

REPORT NO. 98-07

M118 DEMOLITION CHARGE IN WIREBOUND WOODEN BOX
UNITED NATIONS (UN) PERFORMANCE ORIENTED PACKAGING (POP) TESTS

TABLE OF CONTENTS

| PART | PAGE NO. |
|-------------------------------|----------|
| 1. INTRODUCTION..... | 1-1 |
| A. BACKGROUND | 1-1 |
| B. AUTHORITY | 1-1 |
| C. OBJECTIVE | 1-1 |
| D. CONCLUSION..... | 1-1 |
| 2. ATTENDEES..... | 2-1 |
| 3. TEST PROCEDURES | 3-1 |
| 4. UN POP TESTS | 4-1 |
| 5. HAZARD CLASSIFICATION..... | 5-1 |
| 6. PHOTOGRAPH..... | 6-1 |
| 7. DRAWING | 7-1 |

PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV), was tasked by the U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct United Nations (UN) Performance Oriented Packaging (POP) on the package of M118 demolition charges in a wirebound wooden box, for compliance with UN POP requirements.

B. AUTHORITY. This program was conducted IAW mission responsibilities delegated by the U.S. Army Material Command (AMC), Logistics Support Activity Packaging, Storage, and Containerization Center (LOGSAPSCC). Effective 9 July 1993, the three letter designator "DEV" was assigned for use when conducting UN POP tests. Effective 9 August 1994 this designation was included in the Joint Regulation AR 700-143, Performance Oriented Packaging of Hazardous Materials.

C. OBJECTIVE. To determine if this item meets UN POP requirements.

D. CONCLUSION. As tested, the wooden wirebound box for the M118 demolition charge met all UN POP requirements with no problems encountered during testing.

PART 2

APRIL 1998

ATTENDEES

Bradley J. Haas
Mechanical Engineer
DSN 585-8989
815-273-8989

Director
U.S. Army Defense Ammunition Center
ATTN: SIOAC-DEV
3700 Army Depot Road
Savanna, IL 61074-9639

PART 3

TEST PROCEDURES

The test procedures outlined herein were extracted and summarized from the Bureau of Explosives (BOE) Tariff No. BOE-6000-L, Subpart M, Section 178.600. All tests were conducted to Packing Group II requirements.

A. **Drop Test.** Each package will be dropped onto a nonyielding surface from the height and orientations listed below. The drop height is measured as the vertical distance from the target to the lowest point on the package. The drop height for Packing Group I is 1.8 meters (5.9 feet), for Packing Group II it is 1.2 meters (3.9 feet), and Packing Group III is 0.8 meters (2.6 feet).

| Packaging | No. of tests | Drop orientation of samples |
|---|-----------------------------------|---|
| Steel drums, Aluminum drums, Metal drums (other than steel or aluminum), Steel jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and jerricans, Composite packagings which are in the shape of a drum. | Six — (three for each drop) . . . | First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on the circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body. |
| Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are in the shape of a box. | Five — (one for each drop) . . . | First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample). |
| Bags — single-ply with a side seam. | Three — (three drops per bag) . | First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples). |
| Bags — single-ply without a side seam, or multi-ply | Three — (three drops per bag) . | First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples). |

B. **Stacking Test.** The test sample must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport. The minimum height of the stack, including the test sample, must be 3.0 meters (10 feet). The duration of the test must be 24 hours, except that plastic drums, jerricans, and composite packaging 6HH, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 degrees Celsius (104 degrees Fahrenheit). Alternative test methods which yield equivalent results may be used if approved by the Associate Administrator for Hazardous Materials Safety.

C. **Vibration Test.** Three sample packagings, selected at random, must be filled and closed as for shipment. The three samples must be placed on a vibrating platform that has a vertical or

PART 4

UN POP TESTS

M118 Demolition Charge in Wirebound Wooden Box

U.S. Army Defense Ammunition Center
SIOAC-DEV, Savanna, IL 61074-9639
815-273-8908
Jerome H. Krohn

| | |
|--|--|
| Test Report Number: 98-07 | Service Code: DEV |
| Product NSN: 1375-00-728-5941 | Nomenclature: Charge, Demolition, M118 |
| DODIC: M024 | |
| Shipping Name: Charge, Demolition | |
| Hazard Class: 1.1 | Packing Group: II |
| Physical State: Solid | NALC/DODAC: None |
| CAA Number: None | EX Number: None |
| CFR 49 Packaging Method: Part 173.62, Packing Group II, Method E-117 | |
| Net Explosive Weight: 18.18 kgs (40 lbs) | |

DESCRIPTION OF PACKAGINGS TO BE TESTED

EXTERIOR CONTAINER

Exterior Container: Wirebound Wooden Box

CFR 49 Reference Number: Part 173.62, Packing Group II, Method E-117

UN Code: UN 0048

Specifications: MIL-B-46506, Grade A, Drawing Number: 8876128
Type II, Class 1

Net Quantity Weight: 24.3 kg (53.4 lbs)

Tested Gross Weight: 28.4 kg (62.6 lbs)

Dimensions Interior: L-15-5/16" X W-12-1/2" X H-6-3/8"

Manufacturer: Great American Wirebound, Fernwood, MS

Year Container Manufactured: 1997

Drawing Number(s): N/A

Cushioning: Fiberboard fillers as required.

Closure: 4 wire hoops on side of container are brought through the 4 wire loops on the lid,
then folded over.

INTERMEDIATE CONTAINER

Intermediate Container Description: None

Specification Number: N/A

Container NSN: N/A

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: N/A

Number Of Intermediate Containers: N/A

UNIT CONTAINER

Unit Container Description: Plastic bag

Unit Container Specification: N/A

Unit Container NSN: N/A

Unit Container Cushioning: None

Unit Container Closure Method: Sealing clip and heat shrink bag

Unit Container Dimensions: L-12-1/2" X W-3-1/4" X H-1-1/4"

Number of Charges Per Unit Container: 4

Number of Charges Per Box: 20

SPECIAL NOTES

All exterior, and unit containers must be inspected prior to use. Inspect for physical damage and structural integrity of the containers.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes: Military or DOD licensed truck and rail.

Specific Gravity: N/A

Hydrostatic Test Pressure Applied: N/A

Leakproofness Test Pressure Applied: N/A

TEST PROCEDURES

| <u>Tests Conducted</u> | <u>Test Method</u> | <u>Test Results</u> |
|-----------------------------------|------------------------|---------------------|
| (1) Pre-Conditioning (fiberboard) | Part 178.602 | N/A |
| (2) Drop Test | Part 178.603(e)(1)(ii) | Pass |
| (3) Leakproofness Test | Part 178.604 | N/A |
| (4) Hydrostatic Pressure Test | Part 178.605 | N/A |
| (5) Stacking Test (1,000 lbs) | Part 178.606(c)(1) | Pass |
| (6) Vibration Test | Part 178.608(b)(3) | Pass |

rotary double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate. The test must be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material approximately 1.6 mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

D. Pass/Fail Criteria. A package passes the above tests if there is no rupture or leakage from any of the samples. No test sample should show any deformation which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

PART 4

UN POP TESTS

M118 Demolition Charge in Wirebound Wooden Box
United Nations (UN) Performance Oriented Packaging (POP) Tests

U.S. Army Defense Ammunition Center
SIOAC-DEV, Savanna, IL 61074-9639
815-273-8908
Jerome H. Krohn

| | |
|--|--|
| Test Report Number: 98-07 | Service Code: DEV |
| Product NSN: 1375-00-728-5941 | Nomenclature: Charge, Demolition, M118 |
| DODIC: M024 | |
| Shipping Name: Charge, Demolition | |
| Hazard Class: 1.1 | Packing Group: II |
| Physical State: Solid | NALC/DODAC: None |
| CAA Number: None | EX Number: None |
| CFR 49 Packaging Method: Part 173.62, Packing Group II, Method E-117 | |
| Net Explosive Weight: 18.18 kgs (40 lbs) | |

DESCRIPTION OF PACKAGINGS TO BE TESTED

EXTERIOR CONTAINER

Exterior Container: Wirebound Wooden Box

CFR 49 Reference Number: Part 173.62, Packing Group II, Method E-117

UN Code: UN 0048

Specifications: MIL-B-46506, Grade A, Drawing Number: 8876128
Type II, Class 1

Net Quantity Weight: 24.3 kg (53.4 lbs)

Tested Gross Weight: 28.4 kg (62.6 lbs)

Dimensions Interior: L-15-5/16" X W-12-1/2" X H-6-3/8"

Manufacturer: Great American Wirebound, Fernwood, MS

Year Container Manufactured: 1997

Drawing Number(s): N/A

Cushioning: Fiberboard fillers as required.

Closure: 4 wire hoops on side of container are brought through the 4 wire loops on the lid,
then folded over.

INTERMEDIATE CONTAINER

Intermediate Container Description: None

Specification Number: N/A

Container NSN: N/A

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: N/A

Number Of Intermediate Containers: N/A

UNIT CONTAINER

Unit Container Description: Plastic bag

Unit Container Specification: N/A

Unit Container NSN: N/A

Unit Container Cushioning: None

Unit Container Closure Method: Sealing clip and heat shrink bag

Unit Container Dimensions: L-12-1/2" X W-3-1/4" X H-1-1/4"

Number of Charges Per Unit Container: 4

Number of Charges Per Box: 20

SPECIAL NOTES

All exterior, and unit containers must be inspected prior to use. Inspect for physical damage and structural integrity of the containers.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes: Military or DOD licensed truck and rail.

Specific Gravity: N/A

Hydrostatic Test Pressure Applied: N/A

Leakproofness Test Pressure Applied: N/A

TEST PROCEDURES

| <u>Tests Conducted</u> | <u>Test Method</u> | <u>Test Results</u> |
|-----------------------------------|------------------------|---------------------|
| (1) Pre-Conditioning (fiberboard) | Part 178.602 | N/A |
| (2) Drop Test | Part 178.603(e)(1)(ii) | Pass |
| (3) Leakproofness Test | Part 178.604 | N/A |
| (4) Hydrostatic Pressure Test | Part 178.605 | N/A |
| (5) Stacking Test (1,000 lbs) | Part 178.606(c)(1) | Pass |
| (6) Vibration Test | Part 178.608(b)(3) | Pass |

POP Marking

u 4C1/Y28.4/S/97

n USA/DOD/DEV

CERTIFICATION

Unless expressly stated to the contrary, we certify that all of the above applicable tests have been performed in strict conformance to CFR 49, Subpart M, Parts 178.600 - 178.608. Based on the successful test results shown above, this container is deemed suitable for transport of the hazardous material described herein, provided that maximum tested weights and quantities are not exceeded and the packaging is assembled as tested. The use of other packaging methods or components may make this test invalid.

PREPARED BY: Bradley J. Haas DATE: 30 July 1998
BRADLEY J. HAAS
Test Engineer

SUBMITTED BY: Jerome H. Krohn DATE: 4 Aug '98
JEROME H. KROHN
Chief, Validation Engineering Division

APPROVED BY: William F. Ernst DATE: 4 Aug 98
WILLIAM F. ERNST
Chief, Logistics Engineering Office

PART 5

HAZARD CLASSIFICATION

PERFORM: Query Next Previous Add Update Remove Table Screen ...
Searches the active database table. ** 1: jhcs table**

DOD Component I Tri-Service Coordination Y NSN 1375-00-728-5941
Nomenclature CHARGE DEMOLITION BLOCK M118 PETN DODIC M024
Inhabited Building Distance DOD Hazard Class/Division 1.1
Compatibility Group D Label (First Label) 1
Hazard Symbol Code Label (Second Label)
UN Number 0048 Label (Third Label)
Proper Shipping Name
CHARGES, DEMOLITION

Technical Name

DOT Explosive Registration Number 8805599
High Explosive Wt-lbs 2.000000 High Explosive Wt-kgs 0.907185
Net Propellant Wt-lbs 0.000000 Net Propellant Wt-kgs 0.0
Net Explosive Wt-lbs 2.000000 Net Explosive Wt-kgs 0.907185
Net Explosive QD Wt-lbs 2.000000 Net Explosive QD Wt-kgs 0.907185
PN/Dwg1 9204247 PN/Dwg2 PN/Dwg3
Remarks

Date Changed 9306 Last Action C Elements Chgd OPQ

1 row(s) found

USATCES JOINT HAZARD CLASSIFICATION SYSTEM
LIST OF DATA FROM QUERY BY NSN

Query Date - Apr 10, 1998

COM TSC -----NSN----- DODIC -----ITEM NOMENCLATURE-----

I Y 1375-00-728-5941 M024 CHARGE DEMOLITION BLOCK M118 PETN

| IBD | HCD | CG | L1 | L2 | L3 | UNS | DER | HEW-LBS | HEW-KGS | NPW-LBS | NPW-KGS |
|-----|-----|----|----|----|----|------|---------|----------|---------|----------|---------|
| 1.1 | D | 1 | | | | 0048 | 8805599 | 2.000000 | .907185 | 0.000000 | .000000 |

| NEW-LBS | NEW-KGS | NEWQD-LBS | NEWQD-KGS | HSC | PART-OR-DWG-NO-1 | PART-OR-DWG-NO-2 |
|----------|---------|-----------|-----------|-----|------------------|------------------|
| 2.000000 | .907185 | 2.000000 | .907185 | | 9204247 | |

PART-OR-DWG-NO-3 TECHNICAL NAME

PROPER SHIPPING DESCRIPTION

CHARGES, DEMOLITION 1.1D UN 0048 PGII

SPECIAL REMARKS

END OF LIST

PART 6

PHOTOGRAPH



| | | |
|---|---|--|
| | U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL | |
| DAC-DEV-98-07-01. This photo shows the wirebound wooden box used in the test. | | |

PART 7

DRAWING

